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EXAMINER	
LEHNER, WILLIAM P	

ART UNIT	PAPER NUMBER
2671	

DATE MAILED: 05/05/2004

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/965,515	LAKE ET AL.	
	Examiner	Art Unit	
	William P Lehner	2671	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *11/3/03*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-30* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-30* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *03 October 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *5*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

1. Claims 1-5, 7-15, 17- 25, and 27-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Arai (2001/0026278A1) in view of Pallister (2002/0101421).

2. In regard to claim 1, A method of modifying a three-dimensional model comprised of three-dimensional data defining bones and a polygon mesh, Note Arai's skeleton and polygons, and his skeleton compression (page 1, paragraph 1). The method comprising: reducing a resolution of the polygon mesh; Arai does not disclose a method of compressing the polygon mesh. Pallister discloses a method of reducing the polygon mesh in order to reduce the amount of data that needs to be stored, and to speed up processing (page 1, paragraph 2). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Arai's compression apparatus to reduce the number of polygons as taught by Pallister because this uses less data and is faster.

3. And reducing a number of bones in the three-dimensional model following reducing the resolution of the polygon mesh. Arai does not reduce the number of bones after reducing the polygon mesh. However, it would have

been obvious to combine Arai and Pallaster to compress the bones after compressing the polygon mesh:

4. Pallister compresses the polygon mesh by removing edges (Pallaster, page 1, paragraph 9). The model is compressed using a progressive mesh reduction process (page 1, paragraph 14). Edges are chosen for removal based on weights, or how important it is to the model (Pallaster, page 1, paragraph 15). Keyframes are used to detect significant movement of the model (Pallaster, page 1, paragraph 13). Edges with little movement are not as significant to the model, have lower weights, and are removed. The object in FIGs 13 and 14 have retained edges b, c, and g because they have moved; but have lost edges a, d, e, and f because they have not moved (Pallaster, page 2, paragraph 22 and FIGs 1, 2, 3, 4, 13, and 14). Pallaster cycles through each keyframe to compress the mesh step in step 1004 and to add weights to a preliminary list in step 1004. This data is used to generate a master list of weights in step 1008. Weights are used to compress the model again in step 1010 (Pallaster, FIG 10).

5. Arai compresses the skeleton 40 after detecting weights 20 and after detecting relative skeleton movement 70 (Arai, FIG 3, elements 20, 70, and 40). Arai's weights also measure movement of the model, specifically the degree of influence of the skeleton on a polygon vertex (page 4, paragraph 43). Skeletons are compressed if their weight values are less than a threshold value or if the have no polygons attached to them (Arai, page 3, paragraph 24 and page 5, paragraphs 54, 56, 57, and 58).

6. Arai's weights are similar to Pallaster's weights so it would be logical to detect them at the same time-- which is before compressing the skeleton (Arai, FIG 3, elements 20 and 40). Relative skeleton movement detecting is done repetitively where Pallister is detecting the

movement between keyframes (Pallister, page 1, paragraph 17 – page 2, line 8). Skeletal information i.e. the movement of bones detected between keyframes from Pallister is the same thing as relative skeleton movement detecting from Arai. Cycling through keyframes takes processing time and this should only be done once if it is possible. Relative skeleton movement detection must also be done before compressing the skeleton (Arai, FIG 3, elements 70 and 40). Pallister compresses the polygon mesh before detecting weights (page 1, paragraph 14 and FIG 10, step 1002 and 1004), and weights are detected before compressing the skeleton. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Arai's compression apparatus to compress the polygon mesh during weight detection as taught by Pallister and then to compress the skeleton afterward because this saves time.

7. Arai's skeleton compression discards the bones with no attached polygons (Arai, page 5, paragraph 57). The polygon compression deletes polygons so it should not be done after the skeletal compression, or else some bones may not have attached polygons if the polygon edges were deleted. A reason why a skeleton might not have a polygon attached to it would be if the polygon mesh had already been compressed.

8. In regard to claim 2, note Arai's parenthood hierarchy (FIG 8), and reduction of the higher-level skeleton (page 4, column 2, lines 18-22).

9. In regard to claim 3, note Arai's the multiple levels of hierarchy (FIG 8). The lower-level skeletons have a higher resolution than their parents, so they are reduced while the parent skeleton is not (page 4, column 2, lines 18-22).

10. In regard to claim 4, note the operation conducted between the compressible skeleton and the lower-level skeleton (page 4, column 2, lines 18-22).

11. In regard to claim 5, Arai does not reduce the polygon mesh. Pallister teaches removing edges of polygons to reduce the amount of data (page 1, column 1, lines 34-36). Removing the edge between two polygons will combine them (Official Notice). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Arai's compression apparatus to combine polygons as taught by Pallister because this reduces the amount of data in the 3D model.

12. In regard to claim 7, Arai's apparatus indirectly receives an instruction from the user to reduce the number of bones. The user sets a weight compression threshold value (page 4, column 1, line 49). This weight compression threshold value is used to determine which skeletons are compressed (FIG 1, elements 31 and 40).

13. In regard to claim 8, note the above rejections to claim 1 and 7. Arai constructs a bone infrastructure using input data (FIG 4, S402).

14. In regard to claim 9, note the above rejection to claim 2.

15. In regard to claim 10, note the above rejection to claim 3.

16. In regard to claim 11, note Arai's computer-readable storage media (FIG 9, elements 200-203). Arai modifies a 3D model, and executable instructions are in the program shown in Arai, FIG 9, element 200.

17. In regard to claims 12 - 17, note the above rejections to claims 2 – 7, respectively.

18. In regard to claim 18, note the above rejections to claim 8 and claim 11. The polygon mesh is associated with the skeleton through weights.

19. In regard to claim 19, note the above rejection to claim 2.

20. In regard to claim 20, note the above rejection to claim 3.

21. In regard to claim 21, note claim 1 and Arai's computer, storage memory, and program (FIG 9, elements 200 and 204). Computers contain processors that execute programs.

22. In regard to claims 22 - 27, note the above rejections to claims 2 – 7, respectively.

23. In regard to claim 28, note the above rejections to claims 18 and 21.

24. In regard to claim 29, note the above rejection to claim 2.

25. In regard to claim 30, note the above rejection to claim 3.

26. Claims 6, 16, and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Arai (2001/0026278A1) in view of Pallister (2002/0101421), in further view of Persson (6317125). Arai and Pallister both have a 3D model, and all 3D models conventionally should have a virtual camera (Official Notice). However, Arai and Pallister are lacking compression based on a distance from the virtual camera. Persson discloses a 3D model containing bones and polygon meshes, and teaches reducing the resolution of objects commensurate with their position in the game space, i.e. distance from a virtual camera (column 2, lines 35-37), in order to optimize the resolution for a particular view (column 1, lines 40-48). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Arai's and Pallister's 3D models to reduce the resolution of the polygon mesh and bones based on an objects distance from the virtual camera as taught by Persson because this optimizes the resolution for a particular view.

Response to Amendment

27. Applicant's arguments filed 11/3/03 have been fully considered but they are not persuasive. In response to the argument that the applied art is not understood, the above rejection provides more clarity.

28. Pallister reads "skeletal information, i.e., the movement of 'bones' defining the skeletal structure of 3D model 10, may be used to determine when to repeat the reduction process." Applicant argues that Pallister's statement is improperly applied because Pallister takes into account movement of the model when determining which details should be removed. However, because Pallister takes into account movement of the model when determining which details should be removed he says in the above statement that relative skeletal movement may be used to determine when to repeat the detail reduction process. Pallister teaches that relative skeletal movement detection data is used for the detail reduction process, or mesh compression, and that the movement detection and mesh compression are done at the same time repetitively. Arai says that the skeleton is compressed after the skeleton relative movement detection (FIG 3). When these references are combined, relative skeletal movement detection and compression are performed before reducing the bones.

29. Pallister does not disclose reducing the number of bones because his invention was about mesh compression. Pallister discloses repetitively detecting relative skeletal movement and using this data to compress the polygon mesh. Arai discloses reducing a number of bones after detecting relative skeletal movement, which is also after Pallister's mesh compression.

30. Claims 8, 11, 18, 21, and 28 are rejected for the same reason as claim 1.

Conclusion

31. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

32. A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

33. Any inquiry concerning this communication or earlier communications from the examiner should be directed to William P. Lehner whose telephone number is 703-305-0682. The examiner can normally be reached on 8:30 - 5 M-F.

34. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Zimmerman can be reached on 703-305-9798. The fax phone numbers for the organization where this application or proceeding is assigned are 703-746-9730 for regular communications and 703-308-9051 for After Final communications.

35. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-306-0377.

WPL

JOSEPH MANCUSO
PRIMARY EXAMINER